

T03D02 – Periodicity Practice

Name.....

1. Three elements are represented by the letters A, B, and C. The three elements have the same number of valence electrons. Element A has electrons in three energy levels and element C is the lightest of the three. Element B has a total of 19 electrons. **Identify** the elements.

2. Fill in the symbol of the element that **BEST** fits each of the following:

most reactive in family IA (1)	
most reactive in family VIIB (17)	
most metallic in family IIA (2)	
most metallic in family IVB (14)	
smallest radius in period 3	
most <u>nonmetallic</u> in period 4	
highest ionization energy in period 5	
highest ionization energy in family VIB (16)	
highest electronegativity in period 2	
most metallic element family VIIB (17)	
element with the least likely-hood to combine	
element with the lowest electronegativity?	
element with the lowest ionization energy?	

3. Arrange the elements K, As and Br in order of

- a. increasing atomic radius.
- b. increasing ionization energy.
- c. increasing metallic character.

4. Which of the four atoms Ca, As, Br or Rb has the

largest atomic radius.	
highest ionization energy.	
least metallic character.	
highest electronegativity.	

5. How many electrons are there in the **valence shells** of each of the following:

N	N ³⁻	O	O ⁻²	Al ⁺³

Which of the ones above are **isoelectronic**?

6. In some versions of the periodic table hydrogen is placed at the top of Group VIIB rather than at the top of Group IA. Justify this location.

7. Answer the following questions about the elements A and B, which have these electron configurations:

A = ...4p⁶5s¹

B =3p⁶d¹⁰4s²4p⁴

Is element A a metal, nonmetal or metalloid?	
Which element would have the greater ionization energy?	
Which element should have the more electronegativity?	
Which element has larger atoms?	

8. **Name the element** corresponding to each of the following characteristics:

The element with the electron configuration 1s ² 2s ² 2p ⁶ 3s ² 3p ⁴	
The element in the alkaline earth metals that has the largest atomic radius	
The element in group VB [15] that has the largest ionization energy	
The element whose +2 ion has the configuration [Kr]4d ⁶ .	
The element with the lowest electronegativity in group VIIB (17)	
The element whose electron configuration is [Ar]3d ¹⁰ 4s ¹ .	

9. Suppose a new element, tentatively given the symbol Et, has just been discovered. Its atomic number is 113.

Depict the electron configuration of the element using spectroscopic notation	
Name another element that you would expect to find in the same group as Et.	
Give the formulas of the compounds of Et formed with O and then Et with Cl.	

10. Are the answers the same in each case or different? Explain.

	Trend	Explanation
What is the trend in size for N ³⁻ , O ²⁻ , and F ⁻ ?		
What is the trend in size for N, O and F?		

11. Tell what happens to atomic size, ionization energy, and electronegativity when proceeding across a period, and down a group. **Explain.**

12. Select the larger member of each pair. Justify

	Largest	Justification:
Sc and Sc ⁺³		
Ba ²⁺ and Ba		
O and O ⁻²		
N and N ⁻³		

13. List the species in order of decreasing radius:

C, C ⁺⁴ , N, O, O ⁻²	
Al, Al ⁺³ , Si, P ⁻³	
Cs, Cs ⁺¹ , Rb	

14. Arrange the members of the following groups in order of increasing ionic radii.

F ⁻¹ , Cl ⁻¹ , Br ⁻¹ , I ⁻¹ , At ⁻¹	
Co ⁺² , Co ⁺³	

16. Define the following terms:
- representative elements
 - transition elements
 - rare earth elements

17. Indicate whether each trends increases, decreases or remains the same across a period.

Across a Period	Trend	Justification:
radius		
ionization energy		
electron affinity		
electronegativity		
non-metallic properties		

18. Indicate whether each trend increases, decreases or remains the same down a group or family.

Down a Group	Trend	Justification:
radius		
ionization energy		
electron affinity		
electronegativity		
non-metallic properties		

19. Define the following terms:

- cation
- anion

How does the size of an anion compare to the size of the atom it came from?

How does the size of a cation compare to the size of the atom it came from?